

# PATENT SPECIFICATION



790,781

Date of Application and filing Complete  
Specification: March 9, 1955.

No. 6938/55.

Application made in France on Oct. 5, 1954.

Complete Specification Published: Feb. 19, 1958.

Index at acceptance:—Classes 89(1), A4; and 108(3), S5H(5A:8).

International Classification:—F06b, f.

## COMPLETE SPECIFICATION

### Improvements in Compression Compensator Devices for Clamped Assemblies

I, JACQUES MULLER, a French Citizen, of 123, Avenue General de Gaulle, La Garenne-Colombes, France, do hereby declare the invention, for which I pray that a patent may 5 be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a yieldable compensator device for interposition between 10 the components of clamped assemblies to permit expansion and contraction.

It is known that certain solid materials "flow" when they are subjected to constant pressure. This is the case with certain metals 15 such as lead, tin and plastic or thermoplastic materials. Other compressible materials are subjected to a permanent deformation under the action of pressure. In a general way expansion and contraction occurs under the 20 action of heat upon clamped assemblies and modifies the pressure exerted on the assembly elements by the clamping means, such as a fastening bolt, so that excessive stresses or play may result.

25 The object of the present invention is to produce a compensator device to be interposed in the assemblies and which yields to expansions or contractions to prevent excessive stresses and take up play.

30 The device according to the invention comprises a casing partially enclosing axially displaceable pressure transmitting elements at each end and a plurality of thin superposed resilient rings interposed between the said 35 elements, at least one of said rings being laterally corrugated.

Abutments may be provided to limit the flattening of the corrugated ring or rings to prevent the latter from exceeding their 40 elastic limit.

Several methods of carrying out the invention will be described in detail with reference to the accompanying drawing in which:—

Fig. 1 is a perspective view of a corrugated 45 ring according to the invention;

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Fig. 2 is a side elevation showing diagrammatically a pile of several discs before compression;

Fig. 3 is a similar elevation showing the pile of rings compressed to a certain extent; 50

Fig. 4 is an axial view of an unclamped assembly comprising a clamping device with rings according to the invention with limiting means for the clamping;

Fig. 5 is a similar axial section showing the 55 position of the clamping elements.

The device according to the invention is based on the use of an annular disc or ring 1 for example of pressed steel as shown on Fig. 1 and which is deformed in relation to 60 its plane to form lateral peripheral corrugations 2. The number of these lateral corrugations may be chosen as desired. Preferably they have substantial width dimensions so as to obtain a large axial compression move- 65 ment.

It will be seen that if a ring of this kind is interposed between two elements to be assembled and clamped, this ring tends by reason of its elasticity to follow automatically 70 all the relative movements of the assembly elements in the axial direction. In the case of contraction it yields by complementary compression thus preventing the assembled elements from receiving an excessive stress. 75 In the case of expansion it yields correspondingly but by the expansion thus preventing the formation of any play between assembled elements.

To increase further the axial compression 80 movement several corrugated rings can be superposed. It is thus possible to proceed in the way indicated on Figs. 2 and 3 by arranging the corrugated rings 1 alternately with flat rigid rings 3. To prevent any 85 excessive compression and possible breakage of the corrugated rings 1, there is provided on the flat rigid rings 3 bosses or projections 4 arranged in such a way that they can be placed below a "valley" between two consecutive 90

bearing points of the corrugated rings. Fig. 3 shows this arrangement and also shows the manner in which the bosses limit the axial compression of the corrugated rings.

5 Figs. 4 and 5 show a clamping arrangement according to the invention. This arrangement comprises a rigid pressure transmitting ring 5 with a central bore which is extended on one face by an annular flange, and a coaxial nut 6. The ring 5 and the nut 6 are partially enclosed by a casing 7. Between the rigid ring 5 and the nut 6 corrugated resilient rings 1 and interposed alternating flat rigid rings 3 are provided. The casing 7 is of rigid cylindrical form, the ends being turned towards the inside to form passage openings for the flange of the ring 5 and for the nut. The latter has an external peripheral groove 8 in which engages the re-entrant rim of the casing forming the other passage opening therein. The assembly is located in the sleeve with a certain preliminary compression of the resilient rings and the different elements occupy at rest the position shown in Fig. 4, the bearing ring and the peripheral groove of the nut being applied against the inturned rims of the casing. For the assembly of the two elements 9 and 10 by means of a threaded screw 11 the bearing ring 5 is threaded on the free end of the screw 11 which is caused to pass through the rings 1 and 3 as far as the nut 6. The latter is screwed on the screw until the bearing ring 5 comes into contact with the element 9 and effects the clamping in the usual way which causes the nut to enter the casing and compresses the corrugated rings. When the nut is tightened the various elements occupy the positions shown in Fig. 5. If the screw elongates under the action of heat for example the nut 6 moves away from the elements 9 and 10. The compressed corrugated rings expand in the same ratio and thus prevent play being formed between the parts. If the screw contracts under the action of cooling it brings the nut 6 towards the clamped elements and this nut further compresses the corrugated rings which frees the bolt from any excessive stresses and prevents also excessive pressure

between the elements 9 and 10.

It should be understood that the invention is not limited to the examples described with reference to the drawings and that numerous other applications could be contemplated without departing from the invention as defined by the following claims. It is also possible to visualise variations in the construction of the clamping element comprising the resilient corrugated rings while remaining within the scope of the invention. In general the device according to the invention is applicable to all assemblies comprising clamped elements of which the elongation or contraction may modify the conditions of clamping.

What I claim is:—

1. A yieldable compensator device for interposition between the components of clamped assemblies to permit expansion and contraction, characterised in that the compensator device comprises a casing partially enclosing axially displaceable pressure transmitting elements at each end and a plurality of thin superposed resilient rings interposed between the said elements, at least one of said rings being laterally corrugated.

2. A yieldable compensator device as claimed in Claim 1, wherein the corrugated resilient ring or rings comprise pressed steel

3. A yieldable compensator device according to Claim 1, wherein the assembly of piled rings includes at least one ring of planar form and at least one ring of corrugated form.

4. A yieldable compensator device according to Claim 1 or 2, wherein the pile of assembled rings comprises at least one flat and rigid ring interposed between resilient rings.

5. A yieldable compensator device according to Claim 4, wherein the flat and rigid ring has bosses on one or both faces fitted below the "valleys" formed by the corrugations of the resilient rings to limit the compression thereof.

6. Compression compensator devices substantially as herein described and illustrated.

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